new face upon the cultivation in Java. The bark of some of the trees has yielded as much as 10 per cent. of quinine; and the news of this remarkable result has produced much the same effect on Cinchona planters in Ceylon and Southern India as the discovery of a gold-field on the inhabitants of an Australian city. The Java officials have however behaved with singular liberality in the matter, and in the course of a few years it cannot be doubted that Ceylon will be abundantly supplied with this valuable kind, which, there seems reason to think, may prove to be a distinct species. Part of the seed sent in the first instance to the Nilgiris seems to have found its way to Sikkim, and the Government plantations there are believed to be in possession of a strain of Calisaya, little if at all inferior to that possessed by the Dutch.

The Government of Bengal have effected an enormous saving by using, in hospitals and dispensaries, instead of quinine imported from Europe, the febrifuge manufactured at the Sikkim plantations. The Government estimated that in consequence, by the end of 1879, "the plantations will have cleared off the entire capital that has been invested in them."

And this leads us to what is really the painful feature in Mr. Markham's book. He complains in repeated and in bitter terms of the want of justice which has been shown to those whom he employed in the business of collecting. "Those who did the work have not received fair recompense for most valuable services." It is rather singular to find that he adduces in support of this statement the case of Mr. Ledger, who was not even in any way commissioned to do what he did. But the remuneration which his actual agents received was the ground of no complaint on their part, and was in point of fact liberal compared with that which is given to the collectors who are constantly employed by the great nurserymen, and who too often lose their lives in their arduous pursuits without the satisfaction of feeling that they are doing so in an enterprise like this of lasting utility. But we fear that if Mr. Markham's assistants have reason to complain the blame must, on his own showing, be laid at his own door. He tells us (p. 271): "The system I adopted was . . . to include very slight remuneration in the original agreements. *Thus the loss to Government would be insignificant if the work was not executed satisfactorily*. If, on the other hand, the arduous tasks were successfully performed . . . I anticipated no difficulty in obtaining fitting recognition for such distinguished services." We leave our readers to judge of the probability of such a scheme answering Mr. Markham's expectations. We may go further, and ask how the claims would have stood if, notwithstanding all the pains that were taken, the cultivation of Cinchonas had fared in India—as might even have happened—no better than it at first did in Java.

But there are many other things pleasanter than this which we should like to touch upon if this review had not already run to an inordinate length. So many Englishmen are now in one way or other interested in colonial industries that it will be strange if this interesting book does not find as many readers as it deserves. Besides a complete history of the Cinchona enterprise in the Old World, it gives, in an appendix, accounts of some other South American vegetable products, notably india-rubber. The steps taken at Mr. Markham's instance for the introduction into India of the most important rubber-yielding plants of the New World have been from time to time recorded in our pages. We have only to repair one inadvertent omission on Mr. Markham's part, and point out that the transmission of the Para rubber plant to India was secured by the exertions of Mr. Wickham, as recorded in the Kew Report for 1876, p. 8.

PRACTICAL BLOWPIPE ASSAYING

Practical Blowpipe Assaying. By George Attwood. With Seventy-four Woodcuts. (London: Sampson Low, Marston, Searle, and Rivington, 1880.)

THIS book shows many signs of carelessness on the part of the author. At the very outset, in the Introduction, we meet with strange statements. Mr. Attwood divides the elements into those which are of commercial value and those which are of no commercial value. In the latter class we find Uranium and Tungsten; surely the author does not intend to deny the value of pitchblende and wolfram. He classifies zirconium among the non-metallic elements.

The first part of the work describes the reagents and apparatus; the second, we are told, contains the modes of determining any one of the sixty-four well-recognised elements, and in the third part we have the methods adopted by the author for making quantitative assays by the blowpipe. Finally, Part IV. contains some tables showing the English and American values of gold according to its fineness, and the value of gold coins in the United States.

The apparatus employed is much the same as that recommended by Plattner. Like Neumann, Mr. Attwood very wisely uses riders with his balance instead of the very small weights supplied by some of the other Freiberg opticians; but the balance would be improved by the addition of a movable arm for shifting these riders. The steelyard devised by the author will probably be of use to explorers. From practical experience with the batea I can fully endorse all that is said in its favour, but why are the merits of the iron pan ignored? It has the advantage that it will stand rougher usage than the batea. Again, for washing a sample of tin ore nothing will beat the Cornish vanning shovel.

I regret to see no mention of the useful little pastilles and crucibles made out of charcoal powder, proposed by Griffin thirty or forty years ago and adopted by Plattner. Col. Ross's aluminium plate for sublimates seems also to have escaped Mr. Attwood's notice.

With reference to the list of reagents I must remark that the author does not name all the reagents which his tests require, whilst others are inserted which he does not appear to put to any use. I should be glad to know what he means by inserting "nitrous acid" among his reagents. This is not a misprint for "nitric acid," because that acid has been already named.

The plan of the second part of the work is not one which I should recommend. It simply contains a list of tests for the various elements, but gives no systematic scheme for making the examination of an unknown substance. I fear that the "direct" method advocated by Mr. Attwood will often prove a very tedious one. Many of the tests themselves are not so complete as they

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ought to be. In describing the tests for barium it is said that the bead "can be flamed," but no explanation is given of the process of flaming. The capital test for bismuth with potassium iodide and sulphur is entirely ignored.

I now come to the third part, which treats of quantitative assays. Mr. Attwood's plan of making a check assay in every case with a small quantity of the pure metal is certainly calculated to give the operator confidence in his results. The author adopts 1½ grain as the amount of ore to be taken for an assay. I think he would have done better to have followed Plattner and used the French weights, because there is less chance of making errors where each milligramme means 1 per cent.

For the silver assay Mr. Attwood employs pieces of ordinary charcoal instead of the far more convenient and portable charcoal crucibles designed by Plattner. He also describes a crucible assay for silver ores, which does not appear to possess any advantage over Plattner's scorification method.

There is one most unfortunate error in the book to which I feel bound to call attention. Mr. Attwood gives some tables for calculating the number of ounces of gold or silver per ton from the results of assays of 1½ grain of the ore. In an unlucky moment he forgot that gold and silver are weighed by *troy* weight, and calculated his tables for *avoirdupois* ounces. The consequence is that these tables are not only valueless, but also highly misleading. Let us take one case as an example. Suppose that 1½ grain of ore had yielded 0·01 grain of fine metal. We look down the table (p. 117), and find, according to Mr. Attwood, that the yield would be 238·93 oz. per ton; in reality the yield should be 217·77 oz.

Some neat little retorts have been designed by the author for distilling ores of mercury and amalgam, but he does not mention Küstel's assay.

On coming to the tin assay we have the peculiar statement that silica may be separated from tin ore by boiling t with hydrochloric acid. "The assay being finely powdered, the silica is dissolved." "The dissolved silica is decanted off" (p. 158). Cornish mine agents will be surprised when they are told that, in order to obtain correct results, it is necessary to wash or van as much as *5 lbs.* of an ordinary tin ore (p. 159).

Under the head of nickel no mention is made of the valuable ores from New Caledonia.

Small mistakes are numerous. The size of a box is said to be "twelve inches square" (p. 3); we note also: "*a* most useful addend*a*" (p. 24); "chloride of ammoni*a*" (p. 33); "mangan*i*te" instead of manganate (p. 53), and permanganate (p. 54). The term "raw iron" is used frequently instead of "pig iron," and shows that the author has copied Cornwall's translation blindly. Coal, anthracite, and graphite are said to "volatilise" when heated in the platinum spoon (p. 82). Sieves are made with 2000 holes per "linear" inch (pp. 100 and 137). In the description of cupellation (p. 106) we read: "The lead parts with portions of its oxygen to the copper and other base metals."

In conclusion I think that the value of the book would be increased if a list of *errata et corrigenda* were inserted, correcting some of the errors which, I regret to say, impair its general usefulness. C. LE NEVE FOSTER

OUR BOOK SHELF

Über die von den Trichopterenlarven der Provinz Santa Catharina verfertigen Gehäuse. Von Dr. Fritz Müller. *Archivos de Museu national.* Vol. iii. pp. 99-134, and 209-214. Rio de Janeiro, 1880. (Aus dem Portugieischen übersetzt von dem Bruder des Verfassers, Dr. Hermann Müller in Lippstadt.)

DR. FRITZ MULLER has for some years been engaged upon an investigation of the habits of the Caddis-flies of Santa Catharina, and has shown extraordinary skill in breeding these insects, a matter always difficult, and especially in the case of those that inhabit running water. The results of his researches were foreshadowed in various notes published in the *Zoologischer Anzeiger* and in the *Transactions* of the Entomological Society of London for 1879. But it was well known that the extended information and figures would be given in the Rio de Janeiro *Archivos.* As this publication is somewhat difficult to obtain, and as most of us are not familiar with Portuguese, Dr. Hermann Müller has conferred a great boon by publishing a translation of the paper (accompanied by the two folded plates) in the *Zeitschrift für wissenschaftliche Zoologie* for the present year (pp. 47-87, plates iv. and v.). It is needless to state that the details are of the greatest interest, and we have here the most important contribution to the natural history of *Trichoptera* that has appeared since the publication of Pictet's "Recherches" on the species of Geneva, and worked out in a far superior manner. We cannot here even allude to most of the many marvels of insect-architecture and habits that Dr. Fritz Müller has revealed. Some of the most interesting are the numerous forms of *Helicopsyche,* which build little sand-cases so like shells that they have been described as such; those *Dentalium*-like cases, originally noticed by Aug. St. Hilaire as *Grumicha,* which name our author retains; those instances of parasitism (or worse) in which a larva of one species dispossesses that of another of its house and converts it to its own purposes; those very numerous forms of *Hydroptilidæ,* the most minute of all *Trichoptera,* with cases of the most varied and wonderful structure; above all, that most interesting fact that the rain-water which collects at the bases of the leaves of some *Bromeliaceæ* has a special fauna of its own, including at least one Caddis-worm. The descriptions of these and many others will be read with delight by every biological student; and we hope Dr. Müller will follow up the paper by records of further discoveries, for here, as in all his works, the evidences of superior powers of observation strike one on every page.

The plates are excellent, and aid much in a realisation of the descriptive portion. Dr. Müller's artistic powers are so marked that we cannot but regret he has not furnished details of the form and structure of the perfect insects also, which would have greatly aided systematists; in fact the perfect insects are only alluded to in a casual manner.

Voyages of the Elizabethan Seamen to America. Thirteen Original Narratives from the Collection of Hakluyt, Selected and Edited, with Historical Notices, by E. J. Payne, M.A. (London: De La Rue and Co., 1880.)

WE do not quite understand Mr. Payne's reason for publishing this selection from Hakluyt's classical collection of voyages. The selection is, however, judicious, and cannot fail to be interesting, and at the same time instructive, to those who desire to become familiar with the first beginnings of English conquest in America. Mr. Payne's familiarity with the subject of British colonisation, as exemplified in his excellent little "History of European Colonies," specially qualifies him for making such a selection as the present. His brief Historical Introduction enables the reader to understand the special significance of the voyages contained in this volume. He

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